

DESCRIPTIONS OF TWO NEW SPECIES OF *HYLODES*  
FROM THE ATLANTIC FORESTS OF BRAZIL  
(AMPHIBIA: LEPTODACTYLIDAE)

W. Ronald Heyer and Reginald B. Cocroft

*Abstract.*—Analysis of available advertisement calls and morphology indicates that *Hylodes babax* and *H. lateristrigatus* occur at Santa Teresa, Espírito Santo, Brazil, and that several new species are present within the *Hylodes lateristrigatus* species cluster. We have adequate materials for description of two of these: *H. charadranaetes* from Teresópolis, Rio de Janeiro, and *H. phyllodes* from Boracéia, São Paulo.

This study was begun to determine the nomenclatural status of the smaller species of *Hylodes* that occurs at Boracéia, São Paulo, Brazil. This interest was stimulated by a forthcoming summary of the frogs of Boracéia (Heyer, Rand, Cruz, Peixoto, Nelson, in prep.). In an effort to use the proper names for the *Hylodes*, it became apparent that we would have to evaluate data previously published on species from elsewhere in its range. W. C. A. Bokermann and Eugênio Izecksohn are involved in a long-term revision of the genus *Hylodes* (Bokermann, pers. comm.). At their suggestion (Bokermann, pers. comm.), we report our data and conclusions to facilitate work on the Boracéia fauna.

Two names have been used in the literature for the smaller *Hylodes* from Boracéia and/or Paranapiacaba: *glabrus* (as *Elosia glabra*, Bokermann 1967a) and *lateristrigatus* (as *Elosia lateristrigata*, Cochran 1955). Heyer (1982) demonstrated that *H. lateristrigatus* did not apply to the species from Paranapiacaba, and questioned whether *glabrus* was the correct name for the Paranapiacaba species. Izecksohn and Gouvêa (1983) conclude that *Elosia glabra* Miranda-Ribeiro, 1926, is a senior synonym of *E. pulchra* Lutz, 1951. Through the courtesy of Professor Antenor Leitão de Carvalho, we were able to borrow and examine the holotype of *Elosia glabra*, and we

agree with their conclusion. The Boracéia/Paranapiacaba species is clearly a *lateristrigatus* group member. *Hylodes glabrus* is not, since it lacks the diagnostic dorsolateral light stripe, so this name can not be applied to the Boracéia/Paranapiacaba populations. Based on proximity of localities in the same block of the Serra do Mar, Paranapiacaba and Boracéia would be expected to have the same species of *Hylodes*.

The purposes of this report are: (1) to summarize data we have analyzed on the advertisement calls and external adult morphology of *Hylodes*; and (2) to describe new species for those populations lacking names and for which we have adequate materials for description.

Variation in Calls and Morphology of  
Geographic Samples of the  
*lateristrigatus* Group

Heyer (1982) proposed informal species clusters for *Hylodes* based on external morphology. We follow that system, recognizing that the groupings are ones of convenience and may not be monophyletic. With the exclusion of *glabrus* from this group, the following names pertain to the *lateristrigatus* group: *Hylodes babax* Heyer, 1982; *Hylodes lateristrigatus* (Baumann, 1912); *Hylodes magalhaesi* (Bokermann, 1964); *Hylodes ornatus* (Bokermann, 1967b); *Hylodes otavioi* Sazima and Bokermann, 1982; *Hylodes*

Table 1.—Advertisement call characteristics of members of the *Hylodes lateristrigatus* group.

Population	Call duration (s)	#Notes/call	Note duration (s)	#Notes/s	Dominant frequency (Hz)	Frequency modulation of notes
<i>H. babax</i>	0.2–0.5	4–8	0.04–0.05	16–17	4290–5420	
<i>H. lateristrigatus</i>	1.3–1.6	12–13	0.05–0.07	8–9	3700–4300	+, ↑
<i>H. magalhaesi</i> <sup>a</sup>	1.0	26	0.02–0.03	20–25	1400–3000	+, ↑
<i>H. otavioi</i> <sup>b</sup>	2.0	6–15	0.09–0.10	8	3800–5200	—
<i>H. regius</i>	1.7	22–32	0.02–0.03	14–19	5200–6300	+, ↑
Boracéia						+, ↑
( <i>H. phyllodes</i> )	1.0–2.1	12–20	0.05–0.06	8–11	4100–5700	
Paranapiacaba <sup>c</sup>						+, ↑
( <i>H. phyllodes</i> )	1.8–3.0	15–32	0.03–0.05	10–13	5400–6000 <sup>d</sup>	
Santa Teresa A						+ (weak), ↑
( <i>H. lateristrigatus</i> )	2.4	19	0.05–0.06	8	3100–3900	+, ↑
Santa Teresa B						
( <i>H. babax</i> )	0.6–0.8	10–12	0.03–0.05	14	3500–4900	+, ↑
Teresópolis						
( <i>H. charadranaetes</i> )	1.1–1.3	2–4	0.06–0.17	2–4	4300–5500	+, ↑

<sup>a</sup> Data from Bokermann 1964.  
<sup>b</sup> Data from Sazima and Bokermann 1982.  
<sup>c</sup> Data from Bokermann 1964, 1967.  
<sup>d</sup> Published figures indicate dominant frequency range of 4200–5700 Hz.

*regius* Gouvêa, 1979; *Hylodes vanzolinii* Heyer, 1982.

**Calls.**—Advertisement calls are known for all named members of the *Hylodes lateristrigatus* group except for *ornatus* and *vanzolinii*. It is likely that *vanzolinii* is voiceless (Heyer 1982). In addition to advertisement calls from the type localities of the remaining named species, call data are available for the *lateristrigatus* group from Boracéia, São Paulo; Paranapiacaba, São Paulo; two species from Santa Teresa, Espírito Santo; and a second species (in addition to *lateristrigatus*) from Teresópolis, Rio de Janeiro. Few recordings are available for most of these species; for the following comparisons, the number of calls analyzed ranges from three calls from one individual from the Santa Teresa B population to ten calls from two individuals of *Hylodes charadranaetes*. Field observations (Heyer, pers. obs.), however, indicate that call characteristics in *Hylodes* are consistent within populations, so these samples are considered to be representative.

None of the calls are identical when the

major call features are compared (Table 1). In the two instances of sympatry (Santa Teresa and Teresópolis), the calls differ strikingly. At Teresópolis, *lateristrigatus* and the second species (*Hylodes charadranaetes* n. sp., see below) differ by at least an order of magnitude in number of notes per call and number of notes per second. The two forms are also differentiated in terms of note duration, dominant frequency channel, and frequency modulation within notes (Table 1). The two forms from Santa Teresa differ strikingly in call duration, number of notes per call, and number of notes per second; the broadcast channel and note duration are also distinctive, though they show some overlap (Table 1). The distinctiveness of the calls of the two forms at Santa Teresa and Teresópolis is consistent with species level differentiation.

Most two-way comparisons of populations for which call data are available demonstrate the same degree of differentiation observed in the sympatric pairs (Table 1). Certain two-way comparisons are not as distinctive, and each is discussed.

1) *Hylodes babax*-Santa Teresa B. None of the major call characteristics (Table 1) differ markedly between the two samples, although the calls are distinct in duration, number of notes per call, and number of notes per second. When tapes of these calls are played one after the other, the calls sound distinctive to the human ear, but it is not possible to tell whether the differences are due to recording (i.e., equipment, distance from specimen, etc.), individual, or species differences.

2) *Hylodes lateristrigatus*-*H. otavioi*. These calls differ somewhat in call duration, broadcast channel, and note duration. Comparison of audiospectrograms indicates more similarities than differences between calls. The call data can not be unambiguously used to determine whether distinct species are involved.

3) *Hylodes otavioi*-Boracéia and Paranapiacaba. These calls differ slightly in terms of number of notes per call and distinctively in note duration. Comparison of audiospectrograms indicates a different note structure for *H. otavioi*; the notes of the Boracéia and Paranapiacaba populations have a simpler and more vertical appearance on the audiospectrograms. Furthermore, there is no indication of pairing of notes in *H. otavioi*, which occurs in the other two populations. We believe these differences are indicative of species level differentiation.

4) *Hylodes lateristrigatus*-Santa Teresa A. The calls differ only in call duration and number of notes per call; this simply indicates a longer call. The broadcast channel, though somewhat distinctive, is overlapping. Comparison of audiospectrograms of the calls shows them to be very similar in other structural components. The differences between calls are more of the level expected for geographic variation than for species level differentiation.

5) Boracéia-Paranapiacaba. The calls differ somewhat in each of the major call characteristics (Table 1) but each characteristic shows some overlap. If the data from Bok-

ermann's (1964, 1967a) figures are used rather than the values he presents in the text, the broadcast channels are identical. Comparison of audiospectrograms indicates that two features are shared by these two populations alone. First, there is noticeable frequency modulation within the call, which begins at a higher frequency and ends at a lower frequency. Other known *lateristrigatus* group members have either no noticeable frequency modulation of the call or an increase in frequency after the first one or two notes of the call. Second, the calls from the Boracéia population tend to have paired notes given at the end of the call. Bokermann's (1964, 1967a) audiospectrograms suggest the same pattern, though not as strongly as do the Boracéia audiospectrograms. We interpret the Boracéia and Paranapiacaba calls to represent the same species.

*Morphology.*—Within the *lateristrigatus* group, *H. ornatus*, *H. regius*, and *H. vanzolinii* are distinctive in size and/or pattern (see Heyer 1982). The remaining populations are strikingly similar in morphology. The two forms occurring at Teresópolis differ mostly in size, with subtle pattern differences (Heyer 1982). There is a much smaller size difference between the two forms from Santa Teresa (adult males 32.7–33.6 mm SVL versus 36.7–37.1 mm SVL) and we can find no other differences. In order to examine the morphological variation among populations of the *lateristrigatus* group that are similar in appearance, a discriminant function analysis was performed. Although samples were limited, the results are instructive. Because only males were available for the Santa Teresa A and B forms, the analysis is limited to males. The variables measured and used in the analysis were: SVL, head length, head width, vertical tympanum diameter, eye diameter, eye-nostril distance, internarial distance, width of third finger disk, width of fourth toe disk, hand length, femur length, tibia length, and foot length. Initially, three samples were



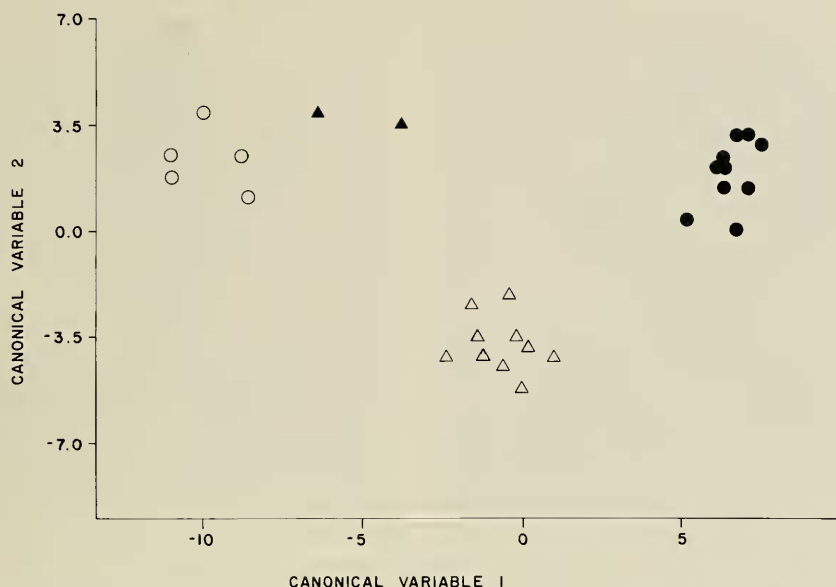


Fig. 1. Discriminant axis plot of males of four samples of the *Hylodes lateristrigatus* group. Triangles = Teresópolis, solid triangles = Santa Teresa B, circles = *lateristrigatus*, solid circles = Boracéia.

used for the preformed groups: *lateristrigatus* (two males from Teresópolis and one from Correias), Teresópolis, and Boracéia. These three groups were separated by the discriminant function analysis. The canonical variable coefficient results were used to plot four additional specimens on the plot of the first two canonical variables. Prior to the analysis, we were unable to differentiate morphologically the *lateristrigatus* males from the two Santa Teresa A males. The two Santa Teresa A males were adjacent to the *lateristrigatus* males when plotted, and the two Santa Teresa B males were closest to the Santa Teresa A males. Next, four preformed groups were analyzed: *lateristrigatus* (five males from Correias, Teresópolis, and Santa Teresa), Boracéia (ten males), Teresópolis (ten males), and Santa Teresa B (two males). There is 100% discrimination of cases among these groups. The plot of the first two canonical variables accounts for 95% of the total dispersion, and best separates the groups along the first canonical variable, which is size related (Fig. 1). In fact, the Boracéia, Santa Teresa B, and

*lateristrigatus* groups are only differentiated on the first axis and the Santa Teresa B and *lateristrigatus* groups are very close to each other, even in size. Only the Teresópolis group is distinctive along the second canonical variable axis. The variable with the highest loading on this axis is the width of the third finger disk (20.4; the next highest value, -9.2, is for eye-nostril distance). Comparison of specimens indicates that the finger disk size does not allow visual discrimination of the Teresópolis specimens from the other samples. The morphological analyses indicate that: (1) the males of Santa Teresa A and *lateristrigatus* form a single morphological group; (2) the Santa Teresa B group is very similar to the *lateristrigatus* group; and (3) the four groups are quite similar, differing principally in size.

There are too few specimens to perform a meaningful discriminant function analysis on external morphology between *H. babax* and Santa Teresa B males. Direct comparisons indicate similarities in size, pattern, and color. There is overlap in male size (*babax* 30.6–32.6 mm SVL, Santa Teresa B

32.0–33.6 mm SVL). The belly patterns of boldly contrasting dark and light mottling are similar. The undersides of the femurs are red in life for both samples (Peter Weygoldt, pers. comm. for Santa Teresa B specimens), a condition recorded only from these two samples and *H. regius*. We do not believe the available data support recognition of Santa Teresa B as a species distinct from *H. babax*. We do point out, however, that differences in call parameters (noted above) and pattern (the lateral stripes are more distinct in the Santa Teresa specimens) exist in the few individuals at hand, and encourage additional call and morphological samples to be gathered to understand the nature of the differences observed.

Combining the available advertisement and morphological data with previously published analyses, we recognize the following species in the *lateristrigatus* group: *babax* (including Santa Teresa B), *lateristrigatus* (including Santa Teresa A), *magalhaesi*, *ornatus*, *otavioi* (more information is needed to clarify the specific status of *otavioi* relative to *lateristrigatus*), *regius*, *vanzolinii*, a new species for the populations from Boracéia and Paranaipacaba, a new species for the second species from Teresópolis, and a new species for an Itatiaia population which is morphologically distinct, but for which only one adult and no call recordings are available. The two new species for which adequate samples are available are described in the following section.

*Hylodes phyllodes*, new species

Fig. 2

*Holotype*.—MZUSP 59934, male, from Brazil: São Paulo; Boracéia, 23°38'S, 45°50'W. Collected by W. Ronald Heyer, 6 Dec 1976.

*Paratopotypes*.—MZUSP 1700–1702, 1704–1706, 1708–1711, 1714, 1716–1721, 3308, 3527, 3529, 4040–4043, 4143, 23050–23053, 23561, 23678–23697, 36874, 37573–37585, 37678–37687, 37701–37703,

37712–37717, 38854, 56497; USNM 129156–129158, 243480–243506.

*Diagnosis*.—*Hylodes phyllodes* has a light stripe from the eye to the groin, distinct at least posteriorly; *H. vanzolinii* lacks such a stripe. The dorsum of *H. phyllodes* lacks the distinct light spots found in *H. regius*. *Hylodes phyllodes* is larger (males 27.5–31.4 mm SVL, females 29.0–35.5 mm SVL) than *ornatus* (males and females 23.2–26.1 mm SVL) and smaller than *lateristrigatus* (males 36.7–39.2 mm SVL) and *otavioi* (males and females 31.4–34.0 mm SVL). *Hylodes phyllodes* differs consistently from *babax*, *charadranaetes*, and *magalhaesi* in advertisement call characteristics. In life, *H. phyllodes* lacks the brick red color on the under surface of the legs found in *H. babax*. The variegated belly of *H. phyllodes* never consists of a bold pattern of distinct light spots on a dark ground which is found in some individuals of *H. magalhaesi*. *Hylodes phyllodes* is smaller than *charadranaetes* (males to 34.7 mm SVL, females to 37.7 mm SVL) and has a more slender body form. Male *H. phyllodes* differ from all other known male *Hylodes* in having nuptial thumb spines.

*Description of holotype*.—Snout truncate from above, protruding in profile; canthus rostralis sharp; lores vertically concave in cross section; tympanum distinct, large, diameter about  $\frac{2}{3}$  diameter of eye; vomerine teeth in two small transverse patches between and on line drawn across posterior edges of choanae, separated by less than length of one vomerine tooth patch; vocal slits present, near angle of jaw on each side; vocal sacs paired, lateral, inflated; finger lengths  $I \approx II < IV < III$ ; middle of thumb with scattered small whitish spines in small ovate area on inner and dorsal surface; dorsal texture finely etched, few scattered warts posteriorly, dorsal surfaces of legs with series of longitudinal ridges; weak fold from eye to groin; throat and belly smooth, under surfaces of thighs smooth anteriorly, areolate posteriorly; finger and toe tips with disks, disks about twice as broad as digit imme-



Fig. 2. Holotype of *Hylodes phyllodes* (MZUSP 59934, a male): dorsal and ventral views.

diately behind disk, finger and toe disks about equal size, upper surface of disks with pair of scutes; fingers fringed, most extensively on fingers III and IV; toes extensively fringed; subarticular tubercles moderate sized, rounded; inner oval metatarsal tubercle about twice as large as pungent, rounded outer metatarsal tubercle; extensive tarsal fold-flap extending  $\frac{7}{8}$  distance of tarsus, continuous distally with toe fringe on outer side of first toe; no metatarsal fold; outer tarsus and sole of foot smooth.

SVL 29.2 mm, head length 10.2 mm, head width 8.9 mm, eye-nostril distance 2.1 mm, femur 13.1 mm, tibia 14.4 mm, foot 14.5 mm.

Dorsum almost uniformly dark brown (fine bronze and gray mottle under microscope) with faint darker mid-dorsal pin stripe with small whitish dots spaced along stripe; upper limbs tan with narrow brown cross bands; flank a blending of dorsal and ventral patterns with distal  $\frac{1}{3}$  of eye-groin fold whitish and distinct; continuation of dorsal color as dark canthal stripe, rest of face lighter brown and white mottle, lightest under eye and continuing under tympanum to shoulder; mid-ventral brown stripe from

almost tip of chin through chest to anteriormost belly; rest of throat and belly mottled brown and white; under limbs mottled with brown and pigmentless areas; posterior surfaces of thighs indistinctly mottled darker and lighter browns.

*Variation.*—Males range from 27.5–31.4 mm SVL, females 29.0–35.5 mm SVL.

In preservative, the dorsum ranges from brown to brassy brown with various markings, including an irregular mid-dorsal light stripe with almost regularly spaced small darker brown (than dorsum) spots, or a series of short dark mid-dorsal dashes, or dorsum scattered with small dark brown spots, or series of mid-dorsal large light blotches, or big darker brown blotches on a lighter brown background, or almost uniform with a series of faint light mid-dorsal dots; pair of dark round or U-shaped spots, one on each side of anus; upper limbs distinctly to indistinctly crossbarred brown on tan; flank with dark brown (almost black) band behind eye across tympanum just to or above arm, fading to mottled brown and white, ranging to flank almost uniformly dark.

In life, iris copper to yellow, darker on sides forming black band with pupil; dor-



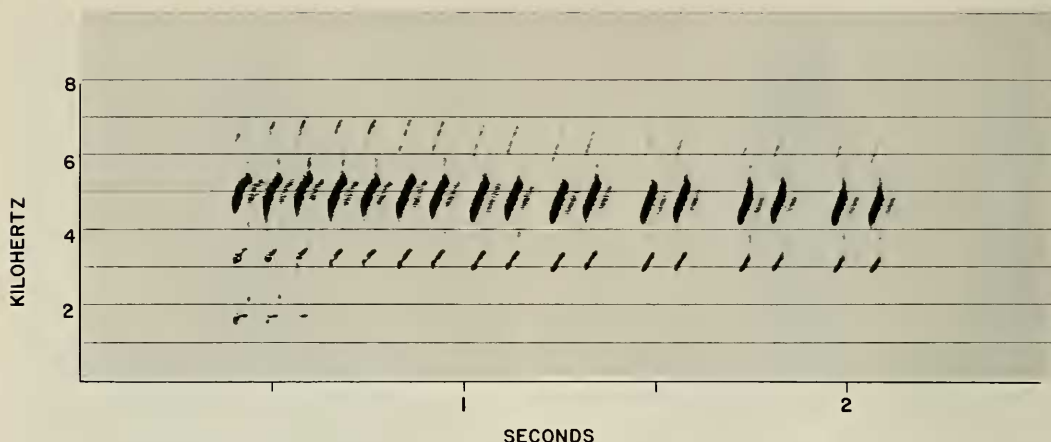


Fig. 3. Advertisement call of *Hylodes phyllodes*. From specimen MZUSP 59934, Brazil, São Paulo, Boracéia. Recorded 6 December 1976, air temperature 20.4°C.

sum olive to dark and light brown; light stripes cream, copper, yellow, yellow-gold, or gold; flanks dark brown; upper limbs dark and light brown with or without red cast; groin yellow or not; throat and belly opalescent, bright opalescent yellow, or yellow to golden with variable brown spotting, distinct or not; under limbs colorless to dirty greenish yellow.

**Advertisement call.**—Calls given sporadically, call duration 1.05–2.10 s; 12–20 notes per call given at rate of 8–11 per s; notes given at regular intervals at beginning of call, usually given in pairs at end of call; note duration 0.05–0.06 s; individual notes not pulsed, but weakly pulsatile; calls slightly frequency modulated, beginning higher, ending lower; calls not noticeably intensity modulated; fundamental frequency about 1500–2200 Hz; dominant frequency (=third harmonic) range at beginning of call 4300–5700 Hz, at end of call 4100–5300 Hz, call with harmonic structure (Fig. 3).

**Etymology.**—From the Greek *phyllo* (leaf) and *oides* (like) in allusion to the difficulty of visually distinguishing the frogs from leaves on or near the ground along streams during the day.

**Referred specimens.**—Brazil: São Paulo; Caminho do Mar km 47 (very near Paranaapiacaba), MZUSP 10216, Ilha de São

Sebastião, MZUSP 9973–9974, 51669, Ilha dos Búzios, MZUSP 23952–23955, São Sebastião, MZUSP 58717.

*Hylodes charadranaetes*, new species  
Fig. 4

**Holotype.**—MZUSP 60648, male, from Brazil: Rio de Janeiro; Alto do Soberbo, near Teresópolis, 22°26'S, 42°59'W. Collected by Ronald I. Crombie, Maria Christina Duchêne, and W. Ronald Heyer, 10 Dec 1977.

**Paratopotypes.**—MZUSP 60649–60669, USNM 245894–245915, collected from Brazil: Rio de Janeiro; 2–5 km NE junction BR 116 and Teresópolis bypass on various dates by various collectors.

**Diagnosis.**—*Hylodes charadranaetes* has a light stripe from the eye to the groin, distinct at least posteriorly; *H. vanzolinii* lacks such a stripe. The dorsum of *H. charadranaetes* lacks the distinct light spots found in *H. regius*. *Hylodes charadranaetes* is larger (males 31.3–34.7 mm SVL, females 31.9–37.7 mm SVL) than *ornatus* (males and females 23.2–26.1 mm SVL) and smaller than *lateristrigatus* (males 36.7–39.2 mm SVL). *Hylodes charadranaetes* differs consistently from *babax*, *magalhaesi*, *otavioi*, and *phyllodes* in advertisement call characteristics. In life, *H. charadranaetes* is not brick red

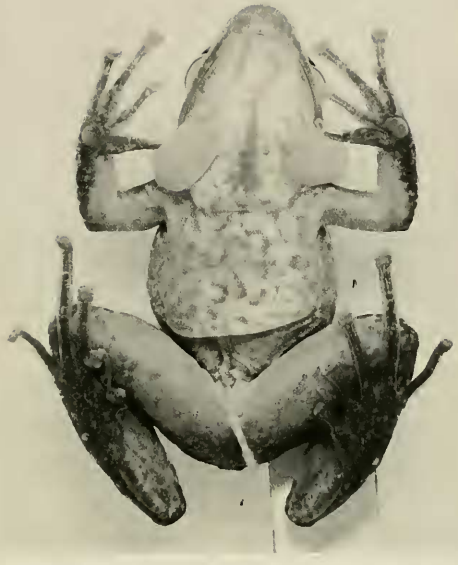


Fig. 4. Holotype of *Hylodes charadranaetes* (MZUSP 60648, a male): dorsal and ventral views.

on the under surface of the legs as is *H. babax*. The variegated belly of *H. charadranaetes* never consists of a bold pattern of distinct light spots on a dark ground such as found in some individuals of *H. magalhaesi*. *Hylodes charadranaetes* is more robust than *H. otavioi*, *phyllodes*, and *babax* and is somewhat larger than either *phyllodes* (males to 31.4 mm SVL, females to 35.5 mm SVL) or *babax* (males to 33.6 mm SVL). Male *H. charadranaetes* differ from male *H. phyllodes* in lacking nuptial thumb spines.

*Description of holotype.* — Snout sub-ovoid from above, protruding in profile; canthus rostralis sharp; lores almost vertical in cross section; tympanum large, diameter greater than  $\frac{1}{2}$  diameter of eye; vomerine teeth in two small patches, separated by about length of one tooth patch, lying on line between posterior portions of choanae; vocal slits present, near angle of jaw; vocal sacs paired, lateral, inflated; first, second, and fourth fingers subequal, third longest; thumb lacking nuptial asperities; dorsal texture finely etched, few scattered warts posteriorly; fold from eye over tympanum to

groin, upper legs with series of longitudinal ridges; throat and belly smooth, under surfaces of thighs smooth anteriorly, areolate posteriorly; finger and toe tips with disks, disks about  $\frac{1}{2}$  again as broad as digit immediately behind disk, finger and toe disks about same size, upper surface of disks with pair of scutes; fingers fringed, developed into extensive flaps on fingers III and IV; toes with extensive fringes produced into flaps; subarticular tubercles moderate, rounded; inner ovate metatarsal tubercle twice size of rounded outer metatarsal tubercle; extensive tarsal fold extending  $\frac{7}{8}$  distance of tarsus, continuous distally with fringe on outer side of first toe; no metatarsal fold; outer tarsus and sole of foot smooth.

SVL 34.4 mm, head length 12.2 mm, head width 10.4 mm, eye-nostril distance 2.6 mm, femur 16.2 mm, tibia 17.3 mm, foot 15.8 mm.

Dorsum variegated tan and light brown with field of darker brown spots almost regularly arranged in rows; upper limbs tan with narrow brown cross bands; dark brown spot on either side of anus; dark canthal



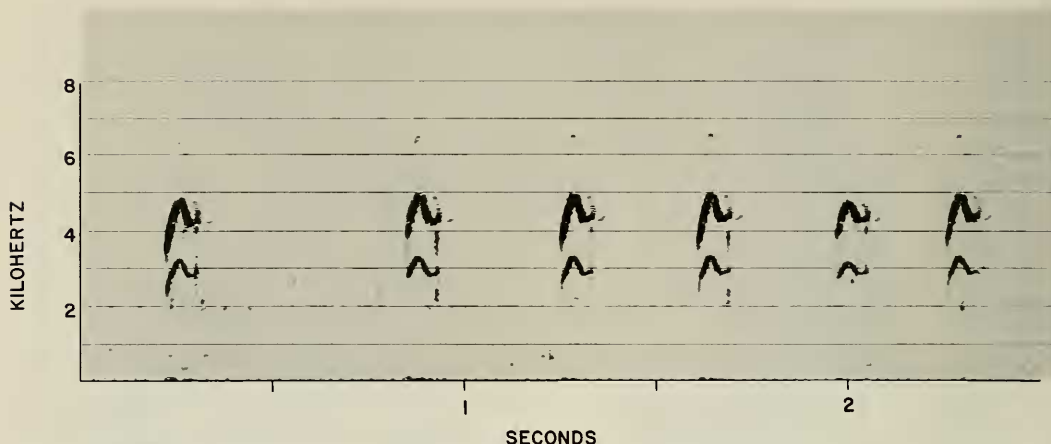


Fig. 5. Advertisement call of *Hylodes charadranaetes*. From specimen USNM 245909, Brazil, Rio de Janeiro, near Teresópolis. Recorded 8 December 1977, air temperature 21.2°C.

stripe extending anteriorly past nostril to about  $\frac{1}{2}$  way to tip of snout, below canthal stripe light with scattering of brown melanophores, becoming lighter under eye and continuing as light stripe to under middle of tympanum; flank a blending of dorsal and ventral patterns with light stripe highlighting eye-groin fold; throat and belly variegated white and tan, tan mid-throat stripe; under arm with scattering of white pigment, under legs variegated tan and pigmentless areas; posterior thigh mottled tan and dark brown.

*Variation.*—Males range from 31.3–34.7 mm SVL, females 31.9–37.7 mm SVL.

Variable number of dorsal spots, sometimes definitely arranged in rows; few specimens with faint row of small light dots mid-dorsally; light lip stripe continuing to shoulder in some specimens; eye-groin fold more or less distinctly highlighted by white stripe, white always distinct in groin area; degree of ventral mottling ranging from mostly white with few tan markings to equal amounts of white and tan or brown vermiculation.

In life, iris bronze; lip stripe cream; eye-groin stripe tan anteriorly, cream posteriorly, belly ranging from white, coppery white, coppery, to yellow, colors on belly same as those on front of thighs and ventral calves;

posterior surface of thighs with faint red wash (belly colors noted for several individuals; other color description based on USNM 245908).

*Advertisement call.*—Calls given sporadically, call duration 1.1–1.3 s; 2–4 notes per call given at rate of 2–4 notes per s; note duration 0.06–0.17 s; notes not noticeably pulsed; each note frequency modulated, rising then falling; calls not noticeably frequency or intensity modulated; fundamental frequency range about 1000–1500 Hz, dominant frequency (third harmonic) range 4300–5500 Hz; calls with harmonic structure (Fig. 5).

*Etymology.*—From the Greek *charadra* (bed of mountain stream) and *naetes* (inhabitant), referring to the habitat of the species.

## Discussion

*Hylodes phyllodes* is the only *Hylodes* with nuptial spines. As expected, these spines occur only in male *H. phyllodes*. The nuptial spines in *H. phyllodes* likely serve a function different from the thumb spines occurring in the related genus *Crossodactylus*, where they occur in both sexes (a rare condition in frogs).

Maxson and Heyer (1982) presented data on relationships among certain populations

Table 2.—Cross reaction of certain *Hylodes* to albumin antisera against *Hylodes pulcher* and *Megaelosia goeldi* from Maxson and Heyer (1982). Values are in immunological distance units.

Species tested	Anti- <i>Hylodes pulcher</i>	Anti- <i>Megaelosia goeldi</i>
<i>Hylodes charadranætes</i>	37	49
<i>Hylodes lateristrigatus</i> — Teresópolis	40	56
<i>Hylodes lateristrigatus</i> — Santa Teresa	42	51
<i>Hylodes phyllodes</i>	60	49
<i>Hylodes</i> sp.—Brejo de Lapa	108	86
<i>Hylodes</i> sp.—Eugenio Lefèvre	39	71

of *Hylodes*, most without specific names, based on immunological microcomplement fixation analysis of albumin. The data for the *lateristrigatus* species cluster are repeated (Table 2), with the names recognized in this paper. The specimen from Brejo da Lapa represents the undescribed new species from Itatiaia. The specimen from Eugênio Lefèvre was not recorded and its morphology is not distinctive; it may be from a population of *H. magalhaesi*, but recordings will probably be required for certain identification. The molecular data are consistent with our recognition of *lateristrigatus* from both Teresópolis and Santa Teresa and support the distinctiveness of the other species recognized in this paper.

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Department of Vertebrate Zoology, Amphibians and Reptiles, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.